

IN THE DRAWINGS:

One attached sheet of drawings includes changes to Figure 8. This sheet replaces the original sheet including Figure 8. In Figure 8, element 351 has been added.

One attached sheet of drawings includes changes to Figure 12. This sheet replaces the original sheet including Figure 12. In Figure 12, element 237 has been renamed 237a.

One attached sheet of drawings includes changes to Figure 13. This sheet replaces the original sheet including Figure 13. In Figure 13, element 237 has been renamed 237b.

One attached sheet of drawings includes changes to Figure 16. This sheet replaces the original sheet including Figure 16. In Figure 16, element 266 has been added.

Attachment: 4 Replacement Sheets
4 Annotated Sheets Showing Changes In Red

REMARKS

This is intended as a full and complete response to the Office Action dated December 8, 2004, having a shortened statutory period for response extended one month to expire on April 8, 2005. Please reconsider the claims pending in the application for reasons discussed below.

In the specification, paragraphs 1, 39, 43, 48, 65, 66, 72 and 78 have been amended to correct minor editorial problems.

In Figure 8, element numeral 351 has been added.

In Figure 12, element numeral 237 has been renamed 237a.

In Figure 13, element numeral 237 has been renamed 237b.

In Figure 16, element numeral 266 has been added. Claims 9 and 24 have been cancelled without prejudice by Applicant. Claims 1 - 27 stand rejected by the Examiner. Claim 28 has been added. Reconsideration of the rejected claims is requested for reasons presented below.

Claims 3, 5, 10 and 11 have been amended to correct matters of form. Claims 1 - 8, 10, 11, 13, 17 - 19, 21, 23 and 25 have been amended to clarify the invention. These amendments are not presented to distinguish a reference, thus, the claims, as amended, are entitled to a full range of equivalents.

Claims 1, 2, 4, 5, 8-13, 16 and 17 stand rejected under 35 USC § 102(e) as being anticipated by U.S. Patent No. 6,017,437 (*Ting et al.*). Applicants respectfully traverse the rejection.

With respect to claims 1-8 and 10-18, *Ting et al.* does not teach vibrating the substrate while flowing the electroplating solution between the anode and the substrate plating surface. As one embodiment of rotation of the substrate, *Ting et al.* does teach agitation of the substrate support, i.e., rotation of the support alternately and repeatedly in opposite directions in quick succession (Column 5, line 62 to Column 6, line 4). However, *Ting et al.* is silent regarding ultrasonic, megasonic, or any other type of vibration of the substrate or substrate support. Therefore, Applicants respectfully traverse the rejection on the grounds that *Ting et al.* does not teach, show, or suggest vibration of the substrate or substrate support while flowing electroplating solution

between the anode and the substrate. Withdrawal of the rejection of claims 1-8 and 10-18 is respectfully requested.

With respect to claims 4-7 and 10-18, the method of applying a plating bias described in *Ting et al.* does not include positioning a cathode contact ring in electrical contact with the plating surface of the substrate to achieve cathode contact. Therefore, Applicants traverse the rejection of claims 4-7 and 10-18 on the grounds that *Ting et al.* does not teach, show, or suggest positioning a cathode contact ring in electrical contact with the plating surface of the substrate. Withdrawal of the rejection of claims 4-7 and 10-18 is respectfully requested.

With respect to claim 5, *Ting et al.* does not teach, show, or suggest an annular region of electrical contact at the periphery of the substrate, nor does *Ting et al.* provide a method or apparatus for continuous or substantially continuous electrical contact with the peripheral portion of the substrate (see ¶ 0053 and Figures 8, 9 and 10 of the present invention). *Ting et al.* instead teaches achieving cathodic contact with the substrate surface via a number of individual electrodes 15, each creating a distinct point of contact with the substrate plating surface (Column 8, lines 16-25 and Figure 9). Therefore, Applicants traverse the rejection of claim 5 on the grounds that *Ting et al.* does not teach, show, or suggest positioning an annular seal radially inward of an annular region on the periphery of the substrate plating surface that is in electrical contact with a cathode contact ring. Withdrawal of the rejection of claim 5 is respectfully requested.

Claims 19-21 stand rejected under 35 USC § 102(e) as being anticipated by *Ting et al.* (U.S. Patent No. 6,017,437). Applicants respectfully traverse the rejection.

Ting et al. describes embodiments of chamber 10 in which multiple processes and, therefore, multiple liquid processing media, are introduced into and drained out of chamber 10 (Column 7, lines 5-14, Column 11, lines 28-34, Column 12, lines 30-47, and Column 13, lines 13-20). *Ting et al.* does not teach, show, or suggest positioning the substrate plating surface face-up on a support member, positioning the support member at a first vertical position in a processing cell, flowing a plating solution onto the substrate plating surface while rotating the substrate plating surface at the first vertical position, capturing the electroplating solution used in the plating process with a first fluid

receiving member, positioning the support member at a second vertical position in the cell, the second position being different from the first position, rinsing the substrate plating surface with a rinse agent at the second vertical position, and capturing the rinsing solution with a second fluid receiving member as recited in claims 19-21. Therefore, Applicants respectfully traverse the rejection of claims 19-21 and request withdrawal of the rejection.

With respect to claim 21, the method described in *Ting et al.* does not comprise draining the electroplating solution to an electroplating solution reservoir. Hence, *Ting et al.* does not teach, show, or suggest methods or apparatus for capturing and draining electroplating solution to an electroplating solution reservoir. Applicants respectfully traverse the rejection of claim 21 and request withdrawal of the rejection.

With respect to new claim 28 which corresponds to original claim 19, *Ting et al.* teaches a method for electroplating a metal onto a substrate plating surface. However, the method taught by *Ting et al.* does not comprise contacting the plating surface with a cathode clamp ring, nor does it comprise draining the electroplating solution to an electroplating solution reservoir. As detailed above, the method and apparatus described in *Ting et al.* for achieving cathodic contact with the substrate plating surface is patentably distinguishable from a cathode clamp ring as described in ¶ 0053 and Figures 8, 9, and 10 of the present invention. Therefore, *Ting et al.* does not teach, show, or suggest contacting the plating surface with a cathode clamp ring. Withdrawal of the rejection of claim 28 is respectfully requested.

Claims 23, 25 and 26 stand rejected under 35 USC § 102(e) as being anticipated by *Ting et al.* (U.S. Patent No. 6,017,437). Applicants respectfully traverse the rejection.

Ting et al. teaches a method for plating and rinsing a substrate in a processing cell. However, the method of *Ting et al.* does not further comprise capturing a plating solution used in the process with a first fluid receiving member. Therefore, *Ting et al.* does not teach, show, or suggest capturing a plating solution used in the process with a first fluid receiving member as recited in claims 23 and 25-26. Withdrawal of the rejection of claims 23 and 25-26 is respectfully requested.

With respect to claims 25-26, the method of *Ting et al.* does not comprise positioning a cathode contact ring to electrically contact the plating surface. As detailed above, the method and apparatus of *Ting et al.* does not teach, show, or suggest a cathode contact ring. Therefore, *Ting et al.* does not teach, show, or suggest capturing a plating solution with a first fluid receiving member nor does it teach, show, or suggest positioning a cathode contact ring in electrical contact with the plating surface. Applicants respectfully traverse the rejection of claims 25-26 and request withdrawal of the rejection of claim 25-26.

Claims 3, 7, 14-15 and 18 stand rejected under 35 USC § 103(a) as being unpatentable over *Ting et al.* (U.S. Patent No. 6,017,437). Applicants respectfully traverse the rejection.

Regarding claim 3, the Examiner states that providing a peripheral seal between the substrate support member and the backside of the substrate 35 when holding the substrate is obvious to one having ordinary skill in the art to prevent contamination of the backside of the substrate 35. *Ting et al.* does teach disposing a front side seal 42 that may be a peripheral—or ring—seal (Column 8, lines 42-43) along the entire periphery of substrate 35. *Ting et al.* does not teach, show, or suggest providing a peripheral seal between the substrate support member and the substrate. Further, Applicants respectfully traverse the rejection of dependent claim 3 on grounds that independent claim 1 is believed to be in condition for allowance. Withdrawal of the rejection of claim 3 is respectfully requested.

Regarding dependent claim 7, Applicants respectfully traverse the rejection of dependent claim 7 on grounds that independent base claim 1 and dependent base claim 4 are believed to be in condition for allowance. Withdrawal of the rejection is respectfully requested.

Regarding claims 14 and 15, the Examiner states that a method of electroplating a metal onto a substrate plating surface including draining a rinse agent back to a rinse agent reservoir and purifying the rinse agent in a purifier to minimize waste produced during the electroplating process is obvious to one having ordinary skill in the art. *Ting et al.* teaches methods and apparatus for performing an *in-situ* rinse of the substrate plating surface after the electroplating process (Column 11, lines 60-64). However, *Ting*

et al. does not teach, show, or suggest further draining the rinse agent back to a rinse agent reservoir as recited in claims 14-15. Withdrawal of the rejection is respectfully requested.

Regarding claim 18, the Examiner states that a method of electroplating a metal onto a substrate plating surface including moving the cavity ring while flowing the electroplating solution is obvious to one having ordinary skill in the art. Please note that claim 18 has been amended to clarify the invention. *Ting et al.* is silent regarding vibration of sleeve 12 or the fluid processing volume. Therefore, the Applicants traverse the rejection on grounds that *Ting et al.* does not teach, show, or suggest the claim as currently amended and would not be obvious to one of ordinary skill in the art. Withdrawal of the rejection is respectfully requested.

Claim 6 stands rejected under 35 USC § 103(a) as being unpatentable over *Ting et al.* (U.S. Patent No. 6,017,437) as applied to claims 1-2, 4-5, 8-13, 16 and 17 above, and further in view of JP 2-217428. Applicants respectfully traverse the rejection of dependent claim 6 on grounds that independent base claim 1 and dependent base claim 4 are submitted to be in condition for allowance. Withdrawal of the rejection is respectfully requested.

Claim 22 stands rejected under 35 USC § 103(a) as being unpatentable over *Ting et al.* (U.S. Patent No. 6,017,437) as applied to claims 19-21 above. The Examiner states that a method of electroplating a metal onto a substrate plating surface further comprising draining a rinse agent to a rinse drain and purifying the rinse agent is obvious to one having ordinary skill in the art. *Ting et al.* teaches the use of multiple liquid process media in a chamber 10 (Column 11, lines 57-64) and the coupling of a single drain 23 for commonly removing electrolyte and other spent liquid process media to a waste treatment component of the system (Column 12, lines 54-56). *Ting et al.* does not teach, show, or suggest separate capture and removal of multiple liquid process media used in a single chamber 10. Further, Applicants respectfully traverse the rejection of dependent claim 22 on grounds that independent claim 19 is believed to be in condition for allowance. Withdrawal of the rejection is respectfully requested.

Claim 24 stands rejected under 35 USC § 103(a) as being unpatentable over *Ting et al.* (U.S. Patent No. 6,017,437) as applied to claims 23, 25 and 26 above. The

Office Action asserts that a method of electroplating a metal onto a substrate plating surface further comprising capturing the rinsing solution with a second fluid receiving member is obvious to one having ordinary skill in the art. *Ting et al.* teaches the use of multiple liquid process media in a chamber 10 (Column 11, lines 57-64). *Ting et al.* also teaches performing a substrate rinsing step at a second vertical process position in chamber 10, the second position being different from the process position for plating the substrate (Column 7, lines 20-22). However, *Ting et al.* does not teach, show, or suggest the capture of the rinsing solution with a second fluid receiving member when the substrate is at the second vertical process position and instead teaches a common waste removal system for chamber 10 comprising a sloping floor of secondary containment region 29 and a single drain 23 (Figure 5). Hence, all spent liquid processing media must subsequently be treated as general chemical waste rather than being individually recycled and/or purified. Therefore, the Applicants respectfully maintain that claim 19 as currently amended is not obvious on the grounds that *Ting et al.* does not teach, show, or suggest separate capture and removal of the rinsing solution with a second fluid receiving member. Withdrawal of the rejection is respectfully requested.

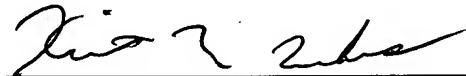
Claim 27 stands rejected under 35 USC § 103(a) as being unpatentable over *Ting et al.* (U.S. Patent No. 6,017,437) as applied to claims 23, 25 and 26 above, and further in view of JP 2-217428. Applicants respectfully traverse the rejection of dependent claim 27 on grounds that independent claim 23 is submitted to be in condition for allowance. Withdrawal of the rejection is respectfully requested.

In conclusion, the references cited by the Examiner, alone or in combination, do not teach, show, or suggest the invention as claimed.

The secondary references made of record are noted. However, it is believed that the secondary references are no more pertinent to the Applicant's disclosure than the primary references cited in the office action. Therefore, Applicant believes that a detailed discussion of the secondary references is not necessary for a full and complete response to this office action.

Having addressed all issues set out in the office action, Applicant respectfully submits that the claims are in condition for allowance and respectfully request that the claims be allowed.

Respectfully submitted,



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ATTY DKT. NO.: AMAT/2622.D1/CMP/ECP/RKK
U.S. SERIAL NO.: 10/630,185 CONFIRMATION: 9224
FILED: JULY 29, 2003
APPLICANT: APPLIED MATERIALS, INC.
TITLE: ELECTRO-CHEMICAL DEPOSITION CELL
INVENTOR: DORDI, ET AL.

FIGURE 8

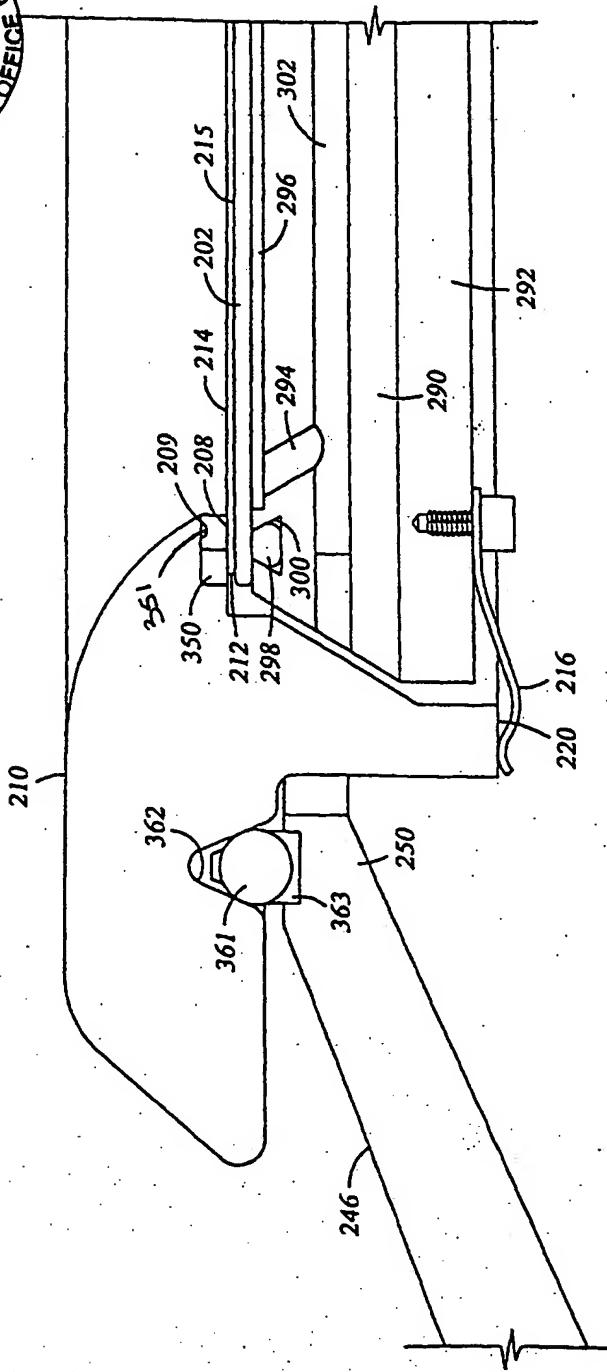


Fig. 8

ATTY DKT. NO.: ANNOTATED SHEET
U.S. SERIAL NO.: AMAT/2622.D1/CMP/ECP/RKK
FILED: CONFIRMATION: 9224
JULY 29, 2003
APPLICANT: APPLIED MATERIALS, INC.
TITLE: ELECTRO-CHEMICAL DEPOSITION CELL
INVENTOR: DORDI, ET AL.

FIGURE 12

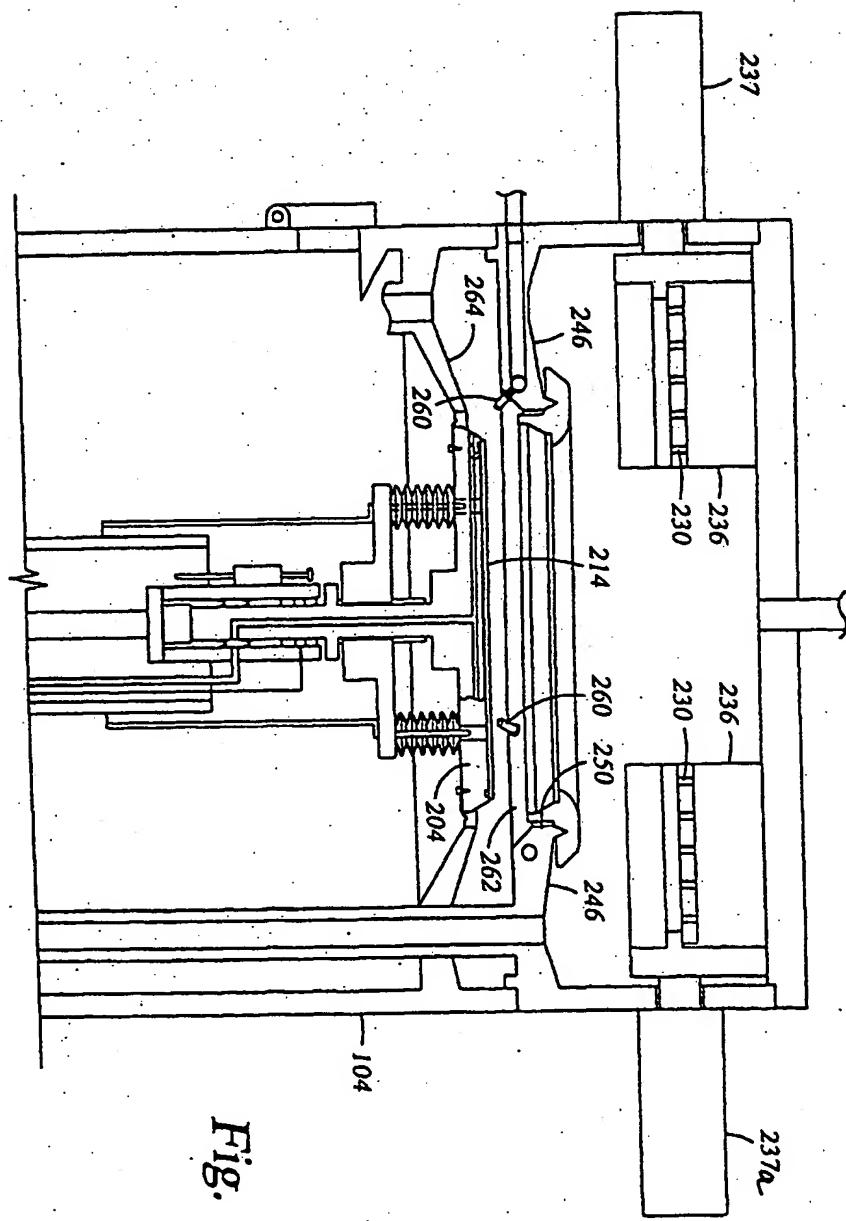


Fig. 12

ATTY DKT. NO.:
U.S. SERIAL NO.:
FILED:
APPLICANT:
TITLE:
INVENTOR:

ANNOTATED SHEET
AMAT/2622.D1/CMP/ECP/RKK
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DORDI, ET AL.

FIGURE 13

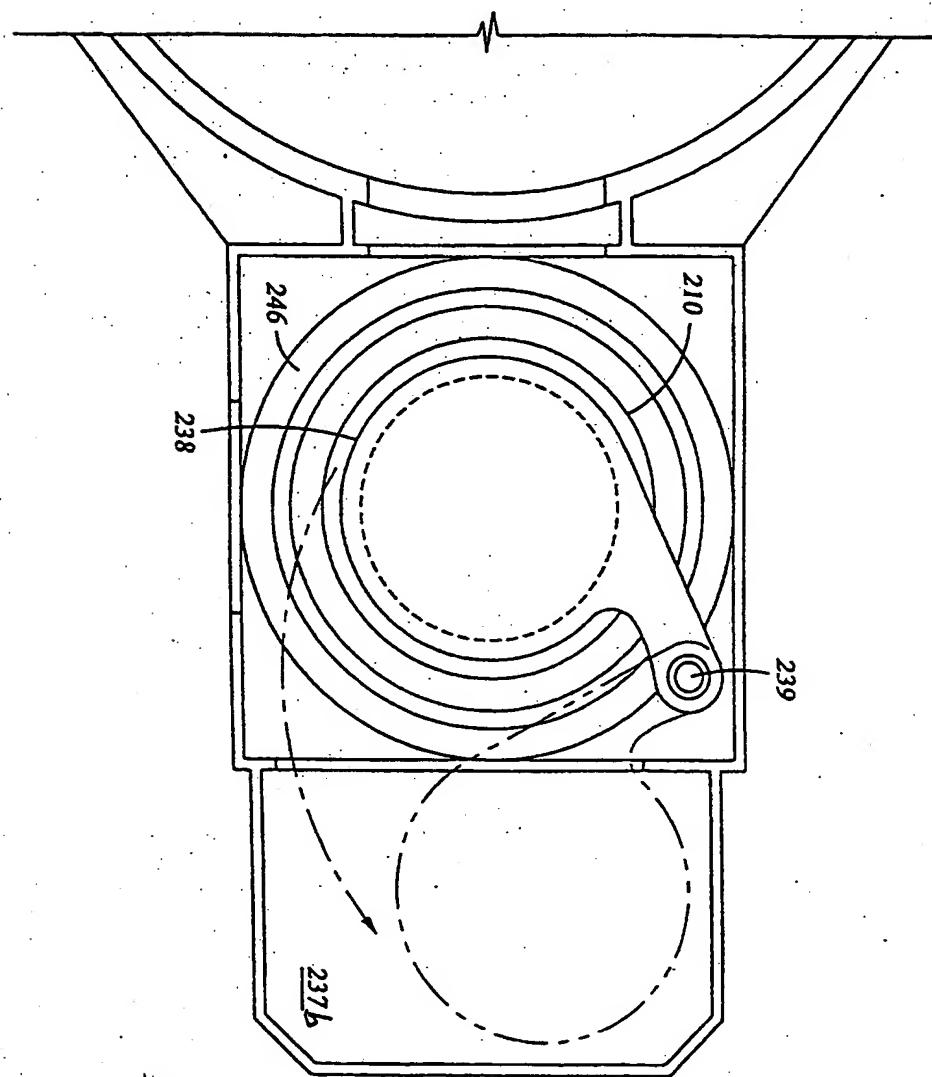


FIG. 13

ATTY Dkt. No.: ANNOTATED SHEET
U.S. SERIAL NO.: AMAT/2622.D1/CMP/ECP/RKK
FILED: 10/630,185 CONFIRMATION: 9224
APPLICANT: JULY 29, 2003
TITLE: APPLIED MATERIALS, INC.
INVENTOR: ELECTRO-CHEMICAL DEPOSITION CELL
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FIGURE 16

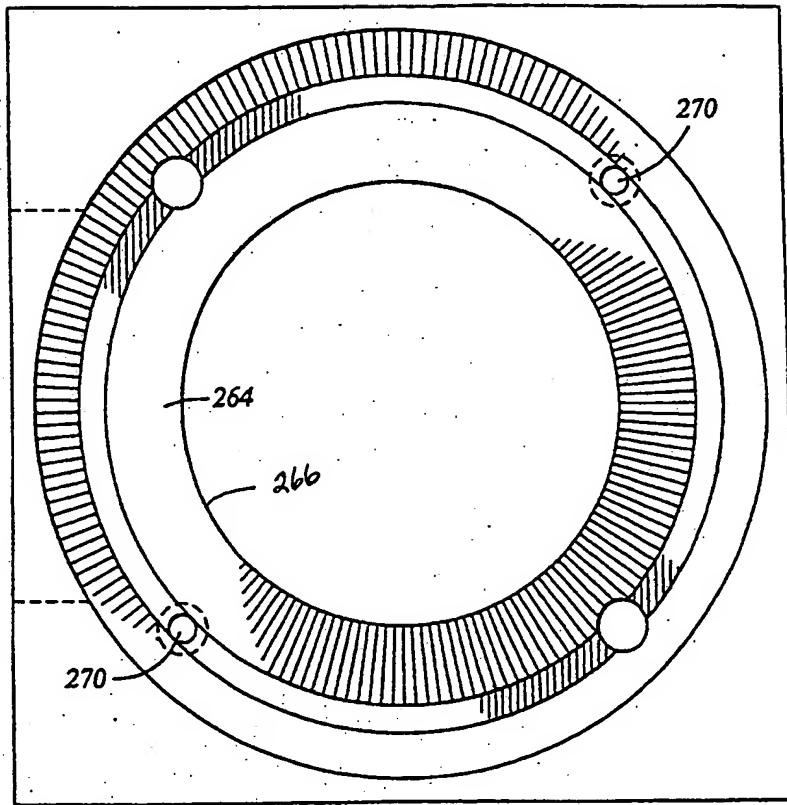


Fig. 16